



UNITED STATES PATENT AND TRADEMARK OFFICE

ccn

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/608,221	06/30/2003	Oh-Sung Song	SEC.559RE	1783
20987 7590 03/07/2007 VOLENTINE FRANCOS, & WHITT PLLC ONE FREEDOM SQUARE 11951 FREEDOM DRIVE SUITE 1260 RESTON, VA 20190			EXAMINER FOURSON III, GEORGE R	
			ART UNIT 2823	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		03/07/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/608,221	SONG ET AL.	
	Examiner	Art Unit	
	George Fourson	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 January 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 17-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9 and 17-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

In the amendment filed 1/25/07, claims 9 and 17-28 should be underlined. 37 CFR 1.173(d).

A supplemental Oath/Declaration is required because the amendment requiring a maximum temperature less than 750°C is not addressed in the Oath/Declaration of record. MPEP 1414.01.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 9 and 17-28 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no description in the original disclosure of limiting the temperature of the high temperature anneal to less than 750°C. Applicant points to columns 5 and 6 of the patent resulting from the parent application, 6255181, but in those locations there is no mention of an upper limit on the temperature range of the high temperature anneal.

Claims 9 and 17-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Fulford, Jr. et al, Sheng et al, Tsai et al and Fann-Mei et al, newly cited.

Fulford, Jr. et al discloses forming polysilicon gate 12 over gate insulating layer 20 on semiconductor substrate 22, injecting low concentration of impurity ions 21 to form LDD regions 23, forming oxide buffer layer 24 over the substrate, forming sidewall spacers 28 on a portion of the buffer layer using anisotropic etching, injecting a high concentration of impurity ions 32 to form heavily doped regions 34 having the same conductivity type as regions 23 wherein regions 23 and 34 form source/drain structures, removing an exposed portion of buffer layer to expose the substrate and performing a SALICIDE process which, by definition, involves deposition of a metal layer and subsequent heating to form a silicide by reaction of the metal layer and the portions of the substrate and gate contacting the metal layer (figures 1-6 and col.8, lines 45-55). The buffer layer is disclosed to prevent contamination (col.6, line 31).

The reference does not clearly disclose the conductivity type of the substrate, the formation of the buffer layer by deposition or the identity of the metal layer being a transition metal layer.

In a similar process wherein an exposed portion of buffer layer 50 is removed to perform a SALICIDE process Tsai et al discloses the substrate being of opposite conductivity type to that of the source/drain regions and use of Ti, Co or Ni as the silicide forming metal layer 80 (fig.8) and performing the SALICIDE process at 400-700°C.

Sheng et al discloses formation of oxide buffer layer 24 by either of oxidation or by deposition to prevent contamination (col.4, lines 60-68).

It would have been obvious to one of ordinary skill in the art to combine the teachings of Fulford, Jr. et al and Tsai et al to enable the disclosed formation of the transistor of Fulford, Jr. et al having the structure of a depletion mode transistor and to enable the disclosed salicide process to be performed according to the teachings of Tsai et al. It would have been obvious to one of ordinary skill in the art to combine the teachings of Fulford, Jr. et al and Sheng et al to enable the disclosed formation of buffer layer

Art Unit: 2823

24 of Fulford, Jr. et al to be performed according to the teachings of Sheng et al such that contamination is mitigated.

One of ordinary skill in the art would have been led to the recited thickness of the oxide buffer layer through routine experimentation to provide the desired degree of protection from contamination. Further, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966). See also MPEP 2144.04(IV)(B).

The process of the combination does not include a two-step annealing process to accomplish the SALICIDE process. Fann-Mei et al disclose a two-step annealing process to form a cobalt silicide including a first anneal at 400-600°C and a second anneal at 750°C to overcome the oxidizing liability of Co (abstract). It would have been obvious to one of ordinary skill in the art to combine the teachings of Fann-Mei et al with those of Fulford Jr., et al and Tsai et al to enable the Co silicide formation to be performed according to the teachings of Fann-Mei and furthermore to overcome the oxidizing liability of Co as disclosed by Fann-Mei et al. It would have been obvious to one of ordinary skill in the art to employ a temperature less than 750°C, such as 749°C, because the difference in temperature between the instant

Art Unit: 2823

invention and that of Fann-Mei et al would have been expected to be small enough that one of ordinary skill in the art would have had a reasonable expectation that essentially the same results would have been obtained.

The examiner takes official notice that formation of cobalt layers by plasma CVD was known prior to applicant's invention. It would have been obvious to one of ordinary skill in the art to combine the known teachings with those of Fulford et al and Tsai et al to enable the disclosed cobalt deposition step to be performed according to the known teachings.

The examiner takes official notice that formation of n-type regions and p-type regions by implantation of P and B, respectively, was known prior to applicant's invention. It would have been obvious to one of ordinary skill in the art to combine the known teachings with those of Fulford et al to enable the disclosed LDD implantation step to be performed according to the known teachings.

The examiner takes official notice that formation of n-type regions and p-type regions by implantation of As and BF₂, respectively, was known prior to applicant's invention. It would have been obvious to one of ordinary skill in the art to combine the known teachings with those of Fulford et al to enable the disclosed source/drain implantation step to be performed according to the known teachings.

Applicant argues that agglomeration occurs at temperatures greater than 750°C in the high temperature annealing step. However, the argument is conclusory and does therefor not enable a reasonable trier of fact to determine that the statement is true.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Fourson whose telephone number is (571)272-1860/272-1860. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith, can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Application/Control Number: 10/608,221
Art Unit: 2823

Page 7



George Fourson
Primary Examiner
Art Unit 2823

GFourson
February 28, 2007